[001] ELECTROMAGNETIC HYSTERESIS UNIT

[002] **FIELD OF THE INVENTION**

[003] ~~According to the preamble of claim 1 t~~The invention relates to an electromagnetic hysteresis unit.

[004] **BACKGROUND OF THE INVENTION**

[005] By electromagnetic hysteresis units will be understood hereinafter as hysteresis brakes and hysteresis clutches. The method of operation of the hysteresis units is based on a magnetic action force of poles that attract each other in the synchronous running and on a constant magnetic reversal of a magnetically, semi-hard material, namely, of a hysteresis ring in the slip operation.

[006] Unlike eddy-current clutches and brakes in hysteresis units, which are based on a different physical principle, the transmissible torque is, to a great extent, independent of the slip rotational speed.

[007] The best known design of such hysteresis units consists of a magnet body with one exciting coil each having an outer and inner pole ring with axially aligned superposed soft iron poles in the same number and spacing, wherein the outer poles are disposed offset in peripheral direction relative to the inner poles in the stationary state or during synchronous running by half a spacing and have an opposite polarization. In the radial intermediate space of the pole rings, the hysteresis ring can rotate as a thin-walled, bell-shaped part without contact.

[008] When magnet coils are traversed by current, a substantially radially oriented magnetic field generates between the poles of opposite polarity. But the pole off-set produces an alternatively tangential reorientation of the magnetic flow in the hysteresis ring and thus a permanent reverse magnetization of all elementary magnets when the hysteresis ring rotates relative to the magnetic body. Therefrom results a torque which depends only on the exciter flow. It can be regulated and controlled by adequately changing the exciting current. Such hysteresis units are known as clutch, e.g. from United States Patent No. 2,488,827. Here the hysteresis ring is disposed radially between two parts of a rotatable magnet body which parts are connected by a disc of non-magnetizable material.

[013] Such hysteresis units are used, among others, for traction regulation for the processing of drawn endless products like wire, cable, rope, sheets, paper, threads, etc. They are also used for brake torque regulating systems and for a load simulation such as for test stands, ergometers, etc.

[014] The problem on which the invention is based is to improve in the slip operation the brief and also the permanent thermal load of a hysteresis unit. This is solved by the features of claim 1. Other developments result from the sub-claims.

[015] **SUMMARY OF THE INVENTION**

[016] According to the invention the peripheral surfaces of the north poles and south poles lie on the same circle, the center of which lies on the axis of rotation. They also lie opposite the same peripheral surface of the hysteresis ring. Thereby the hysteresis ring is able to rotate on one peripheral surface at short distance from the magnets while on the other peripheral surface it is embedded in a rotor made of material having good heat conductivity which can also have cooling devices such as in the form of cooling ribs. It is thus ensured that the heat accumulated be thoroughly removed and that great slip torques can be transmitted for a long time.

[017] The hysteresis ring conveniently surrounds the north poles and the south poles so that it lies with the adjoining rotor parts on the outer periphery of the hysteresis unit. Thereby result, on one hand, large heat radiation surfaces and, on the other, the rotor generates in this area itself a great air movement which favors the convention. In the peripheral area of the rotor cooling ribs are conveniently disposed which can be aligned both axially and in peripheral direction and can be interrupted by slots.

[018] In one development of the invention, the poles are formed by pole fingers which, departing from axial front walls of the magnet body, are fitted upon each other and have between them a larger distance than from the hysteresis ring so that the magnetic flux leads from a north pole to a south pole via the hysteresis ring. The pole fingers can here advantageously overlap in peripheral direction.

[024] **BRIEF DESCRIPTION OF THE DRAWING(S)**

[025] Other advantages result from the description of the drawing that follows. An embodiment of the invention is shown in the drawing. The expert will conveniently regard the features also separately and make with them logical added combinations. In the drawing:

[026] Fig. 1 is a longitudinal section through a hysteresis brake;

[027] Fig. 2 is a section corresponding to the line II-II in Fig. 1;

[028] Fig. 3 is a partial development of a hysteresis ring and a few pole fingers according to Fig. 1;

[029] Fig. 4 is a longitudinal section through a hysteresis clutch wherein the upper half shows a design with connecting ring and the lower half a design with a filling compound;

[030] Fig. 5 is a partial development of a hysteresis ring and a few pole fingers according to Fig. 4, upper half; and

[031] Fig. 6 is a partial development of a hysteresis ring and a few pole fingers according to Fig. 4, lower half.

[032] **DETAILED DESCRIPTION OF THE INVENTION**

[033] The hysteresis unit shown is a hysteresis brake 1. It has a divided magnet body 2, 3 which comprises one magnet coil 6. The magnet body is divided in a radial plane. The two parts 2 and 3 thereof are centered relative each other by a centering ring 8 and interconnected by screws 9. The magnet body 2, 3 consists of soft iron and has on its outer periphery pole fingers 4, 5 which extend substantially axially and are alternatively integrated on the part 2 or part 3 of the magnet body.

[034] If the magnet coil 6 is supplied with current, via a current supply 7, the pole finger 4 form, in the embodiment shown, a north pole on part 2 of the magnet body while the pole finger 5 form south poles on part 3 of the magnet body. The magnet body 2, 3 is mounted fastened to the housing. Thereby the current supply 7 can be easily shifted through one of the free spaces 19 formed between the pole fingers 4, 5.